Attachment B – Summary of Operational Changes

SIMSS Release 5.0 capabilities are listed below. New capabilities are shown in bold.

General

- Implement a client-server architecture
- Run the client user interface on either a separate or same system as the server
- Provide a user-friendly, graphical user interface
- Allow the user to stop, start, pause, and reconfigure the system
- Allow the user to monitor the status of the system and to view the data being manipulated by the system
- Allow the user to save and restore the current system configuration
- Provide the capability to receive and transmit data using standard Internet protocols (IP).
- Provide the capability to receive and transmit data using standard serial interface standards.
- Provide the capability to log data
- Provide the capability to send data from a file
- Provide the capability to generate a CCSDS AOS telemetry stream
- Provide the capability to encode or decode a serial stream
- Provide a generic capability to add headers and trailers to data
- Provide a generic capability to remove and validate headers and trailers from data
- Provide a scripting capability
- Provide the capability to take in and validate non-CCSDS commands
- Provide the capability to generate TDM telemetry
- Provide the capability to validate a CCSDS AOS telemetry stream
- Allow the user to configure the system to perform whatever capabilities are currently desired out of the above capabilities
- Implement save/restore for all modules with configurable data
- Implement version identification for all modules
- Implement pause/resume for modules that need these capabilities
- Implement directory browsing capability for modules needing file selection
- Enlarge standard buffer display
- Enhance SIMSS library to include I64 numerical container data type
- Directive line history/edit capability
- Implement event messages filtering option from GUI control
- Add channel information to the inter-module communication message type 9001
- Fix existing DRs from SIMSS R4.0 (details see AttachE and F)
- **Provide the capability of adding the HW Apogee timing card into SIMSS and create a library access to the timing functions.**
- **Expand the file browse window to display more than 1400 characters, and allow white space in file folder and file names (germane to the browse window and filename entry).**
- **Lengthen the directive entry box to 60 characters.**

- **Cleanup the module and project removal process; and allow running of two projects simultaneously.**

IP input and output

- Receive data in standard IP protocols, specifically TCP/IP (client or server), UDP/IP unicast, and UDP/IP multicast
- Transmit data in standard IP protocols, specifically TCP/IP (client or server), UDP/IP unicast, and UDP/IP multicast
- Allow the user to define the IP address, port number, and data size (or a variable data size) for receiving or sending
- Allow the user to see the data being received or transmitted
- Display the status of input and output, including enabled/disabled status and packet counts
- Interface with Serial IO: relay and/or drop tick message
- Allow access to the second Ethernet card by GUI control
- Fixed DRs for multicast failure and missing CMDXMIT command

Serial input and output

- Receive data in standard serial configuration
- Transmit data in standard serial configuration
- Allow the user to set the serial configuration parameters
- Allow the user to see the data being received or transmitted
- Display the status of input and output, including enabled/disabled status and packet counts
- Encode and decode the serial stream
- Provide telemetry data request ticks through 9001 message type to the data source module
- Implement True/Invert function for BIO outputs
- Implement tail sequence detection
- Implement Serial/IP conversion and buffering
- Allow multiple serial streams
- Allow output buffer size to be adjustable
- Allow Serial Output to set all clock frequencies
- Fixed DRs for LSB Orientation, NRZ-S Output, BIO-M Output, and BIO-S Output
- Fixed DRs for Serial Input Skewing data, Display error of false subframe drop when subframe counter > 1 byte, Serial Output crashes system if stop stream when convolution encoding enabled, and Serial module occasional failure
- Provide a capability to pass a commands block in multiple packets or one packet, specified by command size and max command size information to next module
- **Added the capability of Serial/IP conversion and buffering for ICS card.**

Logging

- Save incoming data to a file

- Allow the user to enable or disable logging and enter the name and maximum size of the log file
- Allow the user to see the data being logged
- Display the status of logging, including enabled/disabled status and the number of bytes written to the file
- Interface with Serial IO: relay and/or drop tick message

File transmission (TxFile)

- Send data from a file
- Allow the user to enable or disable file transmission and enter the name of the file to transmit
- Allow the user to set the file transmission mode and configuration, including block size, number of blocks, automatic or manual transmission, and interval between block transmits
- Allow the user to see the data being transmitted
- Interface with Serial IO: relay and/or drop tick message
- Provide file browsing capability

CCSDS telemetry generation (database-driven flat-file) utilities

- **Allow the generation of an ASCII file, which contains the selected fields from the project database.**
- **Allow the translation of the ASCII file to the binary input files for the telemetry generation.**

CCSDS telemetry generation

- Generate telemetry according to CCSDS AOS standards for packets and VCDUs
- Generate telemetry based on the contents of a formatted text file (as defined in the user's guide). The text file includes packet definitions (including size, data rate, and virtual channel) and virtual channel to physical channel mapping
- Generate up to three physical channels of telemetry
- Update counters in packet headers
- Pack packets into VCDUs with packets crossing VCDU boundaries as needed
- Allow the user to display and change the contents of telemetry packets
- Handshake with the serial module to send telemetry using serial interface
- Allow telemetry to pick up CLCW through packet message
- **Generate telemetry based on information from project database (PDB). The PDB information includes packet definitions (size, data rate, and virtual channel, etc.), and virtual channel-to-physical channel mapping.**
- **The PDB information is read into the memory from flat files.**

Test module

- Provide the capability to monitor data output from other modules from within the same SIMSS configuration

Scripting

- Provide the capability to send a stream of externally-generated directives to a module

Data transport (Wrapper, Stripper, & CmdEcho)

- Implement a generic, file-driven capability to package a stream of data into standard or user-defined message blocks with headers and trailers
- Implement a generic, file-driven capability to extract data from standard or user-defined message blocks, validating and removing headers and trailers
- Provide a standard command echo capability
- Allow relaying the telemetry generation ticks between data source and sink to support Serial I/O for Wrapper and Stripper
- Implement bypass mode directive to depart from data input blocking mechanism for processing command data

TDM command generation

- **Provide a capability to generate non-CCSDS commands**
- **Implement TDM commands with preamble & length, barker code, secondary barker code, postamble & length, hamming init, and polynomial check code.**

TDM command ingest

- Provide a capability to read in and validate non-CCSDS commands
- Update a command counter based upon valid commands received
- Generate an event message for each command received
- Allow command counter location to be settable by user
- Allow GUI configuration for preamble/postamble (length), barker code, and sc address
- Provide a capability to ingest a database file containing commands and associated telemetry verifiers. These verifiers and their values shall be forwarded to another module for telemetry updates.

TDM telemetry generation

- Provide the capability to generate a user-customizable stream of major-frame/minor-frame telemetry
- Allow the user to define counters in the telemetry stream
- Allow the user to define fixed fields in the telemetry stream
- Provide the option of including a CRC field in each minor frame
- Interface with Serial IO: relay and/or drop tick message

CCSDS data quality monitoring

- Provide the capability of receiving and validating a CCSDS AOS telemetry stream by extracting packets from VCDUs

- Allow the user to view the packets received
- Verify that the counters in the packet headers are updating correctly and no packets were missed

Data monitoring
- Provide the capability of monitoring and manipulating data received
- Allow the user to convert the data between NRZ-L and NRZ-M
- Allow the user to invert the data
- Allow the user to view the data in octal, decimal, or hexadecimal
- Allow the user to bit-shift the data left or right

Scenario
- Allow command received to trigger scenario
- Allow scenario to start scenario
- Allow multiple scenarios (up to five, controlled via GUI)
- Allow pause indefinitely capability
- Allow scenario generation to be either serial or concurrent mode
- Allow setting of container items using simple expressions
- Allow setting of container items to expressions involving other container items
- Allow use of Boolean expressions
- **Allow conditional executions (IF and While loops).**
- **Allow scenario module to interface with more than one module.**

Interface to Model Generator
- Allow SIMSS to receive (name, value) pair data generated from Model Generator

CCSDS command ingest
- Provide the capability to receive, validate, and identify CCSDS commands
- Allow the generation of CLCW for each virtual channel to reflect the commands received
- Provide the capability to receive and execute CCSDS FARM special commands

CCSDS command generation
- Provide the capability to create, save, read, modify, and transmit CCSDS telecommand headers and binary files
- Allow the generation of CCSDS composite files
- Allow the processing of raw data file containing CCSDS-formatted command data

Data Encoding

- Provide the capability to receive and encode data before passing to next module
- Include CRC-16, Convolution, Randomization, and Reed-Solomon encoding schemes.
- Allow data encoding process to be an independent module

VC Processor

- Provide the capability to monitor and verify virtual channels on a CCSDS data stream
- Allow VC processing to be an independent module

Packet Processor

- Provide the capability to monitor, verify, and filter packets on a CCSDS data stream
- Allow Packet processing to be an independent module

TDM DQM

- Provide the capability to validate and de-mux TDM data
- Implement TDM DQM module to work with Serial IO

Avtec Input

- Provide the capability to receive serial data through a port on an Avtec serial card

Avtec Output

- Provide the capability to transmit serial data through a port on an Avtec serial card

Telemetry Mod

- Provide the capability to modify telemetry data received
- Allow "Mod Bit" function to be an independent module to replace HOST PSS for Hubble testing and other purposes
- Add a capability for user to define whether minor frame counter is bit flipped
- **Allow user to add CRC**
- Provide a capability to receive and implement telemetry mnemonic updates via a command ingest module
- Allow to be controlled from the scenario module
- Provide a capability to modify all aspects of the database during runtime.